



Government of **Western Australia**
Department of **Mines and Petroleum**

Natural Gas from Shale and Tight Rocks

**An overview of Western Australia's
regulatory framework**

February 2014

www.dmp.wa.gov.au

Contents

| | |
|--|-----------|
| 1. Introduction..... | 2 |
| 2. What is natural gas?..... | 2 |
| 3. Where is shale and tight gas found in WA? | 4 |
| 4. What are the benefits of developing our natural gas resources?..... | 5 |
| 5. What is the current situation in WA? | 5 |
| 6. What might a shale and tight gas project look like? | 6 |
| Footprint | 6 |
| Land access..... | 7 |
| 7. How is shale and tight gas extracted? | 7 |
| Horizontal wells..... | 7 |
| Hydraulic fracture stimulation..... | 7 |
| Water use | 8 |
| Water protection | 8 |
| Chemicals..... | 9 |
| 8. How is the oil and gas industry regulated – now and into the future? | 9 |
| Legislation | 10 |
| Framework | 11 |
| 9. When is the shale and tight gas industry likely to become commercial?..... | 11 |
| 10. What does this mean for our community? | 11 |
| 11. How is the community involved? | 12 |
| 12. Where can I find more information? | 12 |

Introduction

This document provides an introduction to Western Australia's regulation of this emerging industry. A second more detailed regulatory framework document is being prepared and is expected to be available in the second half of 2014.

Natural gas is an important and significant energy source which will continue to underpin the State's economy and energy security. It provides power for our mining, manufacturing and transport industries, and also provides power and gas to homes and businesses.

Ensuring Western Australia continues to have access to affordable and reliable energy will require the development of new natural gas fields, both onshore and offshore.

New technologies have enabled recovery of onshore natural gas from coal seams, shale and tight sandstone to be more viable. Publicity surrounding some projects in the Eastern States and other jurisdictions has raised community concerns the technology to develop new onshore gas resources could present negative health, environmental or social impacts.

Western Australia already has a comprehensive regulatory framework in place for exploration and production in the petroleum industry, which includes shale and tight gas.

In recognising community concern relating to this emerging industry, the Department of Mines and Petroleum (DMP) commissioned an independent review in 2011 of its regulations. As a result, the department introduced new petroleum environment regulations in August 2012 which provide for increased transparency and enforceability. These regulations also strengthened the obligations on industry in relation to water use management and chemical disclosure. Western Australia now has the strongest chemical disclosure requirements of any Australian jurisdiction.

In addition, new petroleum resource management regulations addressing issues such as well integrity and baseline water monitoring have been released for public comment.

DMP is working with other government agencies responsible for upholding the State's values to protect public health, the environment, water resources and equitable land use. DMP is confident the State's regulatory processes are capable of mitigating risks to protect the environment, water and community as this industry develops.

In Western Australia, development of natural gas from shale and tight rock (also known as shale and tight gas or unconventional gas) is in the early stages of exploration and evaluation.

WA is estimated to hold significant shale and tight gas resources in the Kimberley, East Pilbara and Midwest regions. Far more exploration will need to occur to confirm these estimates. The timing as to when the shale and tight gas industry progresses to make a major contribution to WA's economy and energy security will depend on several key factors.

These factors include co-existence with regional communities, balancing land use, the pace of exploration, investor confidence, energy demand, commodity prices and the construction of supporting infrastructure.

The State Government agencies and authorities contributing to the safe and responsible development of the shale and tight gas industry in Western Australia include the Departments of Mines and Petroleum, Agriculture and Food, Environment Regulation, Health, Parks and Wildlife, State Development, Water, and the Office of the Environmental Protection Authority. These agencies are all responsible for upholding the State's values to protect public health, the environment, water resources and equitable land use.

Western Australia's shale and tight gas regulatory framework is coordinated, transparent and risk-based, and is continuously improved in response to new scientific, technological advances and social considerations.

Petroleum operators are accountable for upholding the State's safety and environmental standards. In addition, every company looking to operate in WA is expected to commit to high standards and codes of conduct, and engage and build trust with its local communities.

What is natural gas?

Natural gas is the cleanest-burning fossil fuel. A number of reputable studies find producing electricity from natural gas creates 36 to 47 per cent lower emissions than producing electricity from coal.¹

Natural gas can be extracted from different geological formations and, depending on the type of formation the natural gas is found in, different extraction methods can be required.

Typically, natural gas is trapped in permeable rock formations such as carbonates, sandstones, and siltstones and can flow freely from the rock formation when tapped by a petroleum well. This is because permeable rock formations have tiny interconnected cavities through them, similar to a sponge, which allow the gas to flow.

This is what is known as conventional natural gas and what has been used around the world and in Western Australia for many years. WA's large LNG projects use conventional natural gas.

Natural gas can also be found in harder, less permeable (denser) rock and is recognised by the type of rock it is extracted from, such as:

- shale gas – found in dense shale rock;
- tight gas – found in compacted sandstone or limestone; and
- coal seam gas – found in coal seams.

Gas trapped within these rock formations requires engineering intervention to help release it from the rock and flow at commercially viable rates. Shale and tight gas requires hydraulic fracture stimulation (also known as hydraulic fracturing or fracking) to fracture the gas-bearing rocks to create a path for the natural gas to flow.

Coal seam gas typically requires dewatering of coal seam beds to relieve pressure on natural gas held tightly to the coal seams. Occasionally, hydraulic fracture stimulation is required.

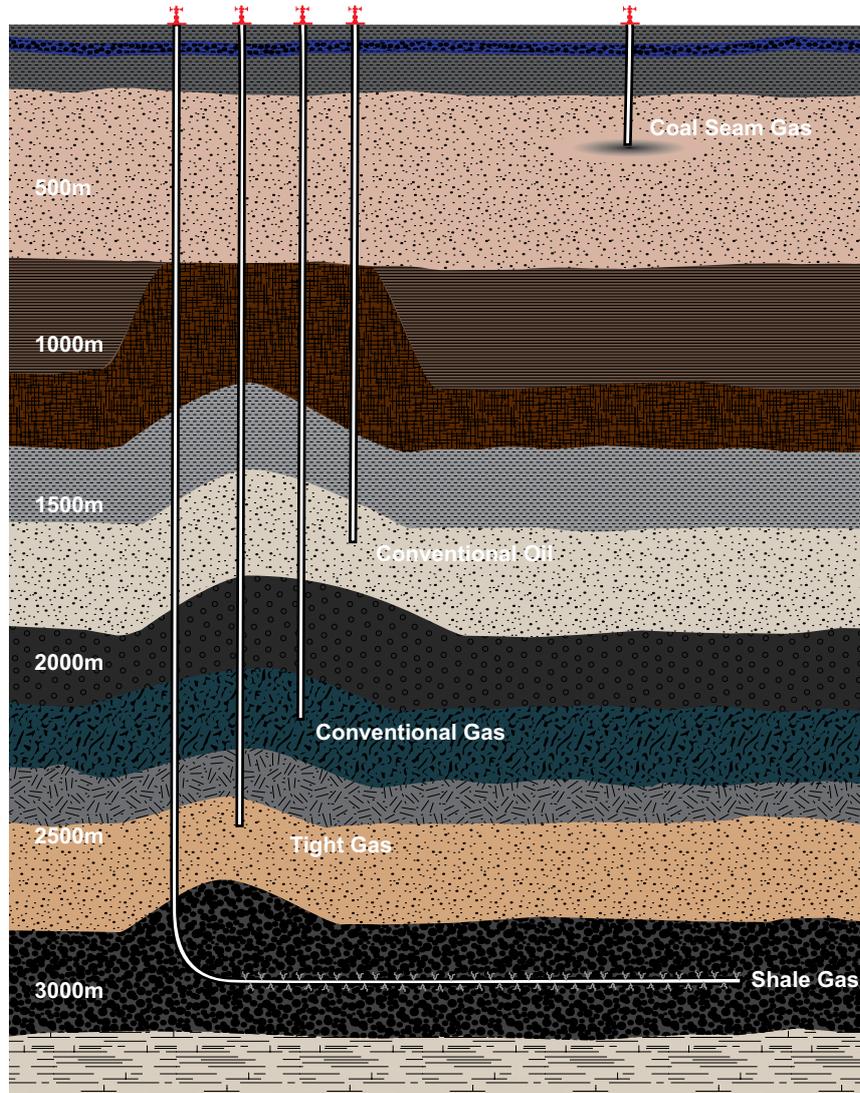
While Western Australia may have coal seam gas, no known commercially prospective coal seam gas resources have been found to date. In Australia, these shallower coal seam gas resources are found in the Eastern States where they are currently being developed.

¹International Gas Union June 2012 report "Shale Gas, The Facts about the Environmental Concerns"

Natural Gas from Shale and Tight Rocks – An overview of Western Australia’s regulatory framework

Recent advances in drilling techniques and hydraulic fracturing have made the production of shale and tight gas resources more economically viable.

The diagram below indicates the typical depths at which different types of oil and gas can be found in WA, compared to depths for coal seam gas being developed in other parts of Australia.



The table below is a summary of the depth and extraction methods of these types of gas resources compared to traditional extraction of natural gas.

| | Gas Extraction Methods | | | |
|-----------------------------------|------------------------|-------------------------|-------------------|-------------------------|
| | Shale gas | Tight gas | Coal seam gas | Traditional |
| Resource type | Natural gas | Natural gas | Natural gas | Natural gas |
| Depth below surface | 2000 – 5000 metres | 2000 – 5000 metres | 300 – 1000 metres | 1000 – 5000 metres |
| Rock type | Shale | Sandstone and limestone | Coal seams | Sandstone and limestone |
| Production well type | Vertical or Horizontal | Vertical or Horizontal | Vertical | Vertical and Horizontal |
| Is hydraulic fracturing required? | Always | Always | Occasionally | Rarely |

Where is shale and tight gas found in WA?

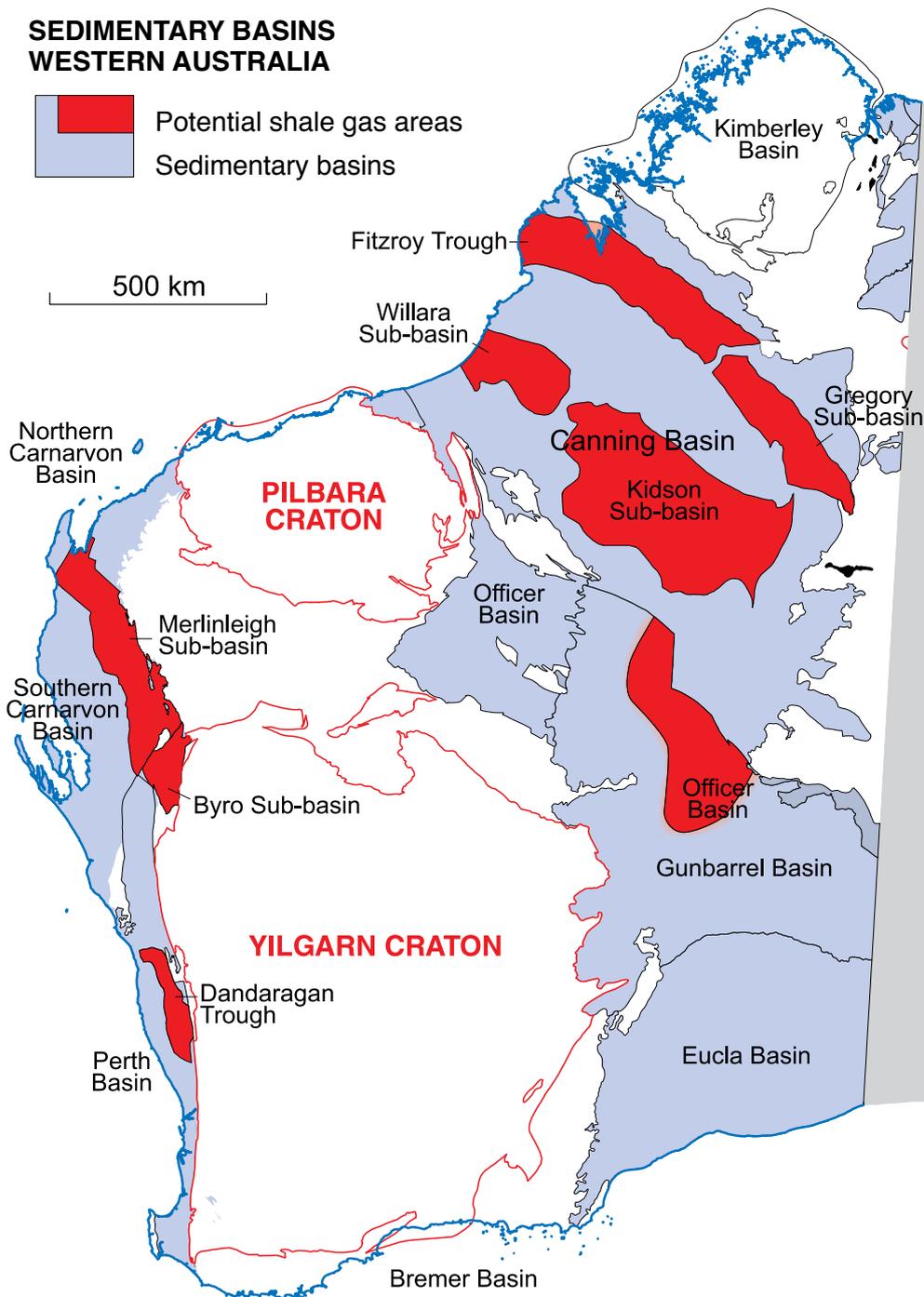
In Western Australia, prospective resources for shale and tight gas are located in the Kimberley, East Pilbara and Midwest regions. There may also be shale and tight gas in other regions, but further understanding of the geology in these areas is required.

WA potentially contains an estimated 280 trillion cubic feet of shale and tight gas².

Of this, approximately 235 trillion cubic feet are in the Canning Basin (Kimberley and East Pilbara regions) and 45 trillion cubic feet are in the northern Perth basin (Midwest region).

To put this into perspective, each year Western Australia consumes around 0.5 trillion cubic feet of natural gas for everyday requirements such as electricity, heating, transport, manufacturing and mineral processing. Assuming only 20% of the estimated resource in Western Australia can be extracted commercially, this would supply the State for approximately 100 years at the current rate of use.

The diagram below shows the potential shale (and tight) gas resource locations in WA.



²Source: Department of Mines and Petroleum and U.S Department of Energy 2013 (IEA)

What are the benefits of developing our natural gas resources?

Development of a shale and tight gas industry has the potential to deliver benefits to Western Australia including energy security, a cleaner energy mix and economic growth.

Currently, WA’s energy demands are primarily met by natural gas (55 per cent) followed by oil (30 per cent), black coal (13 per cent) and renewable energy (2 per cent)³.

The State’s energy demand for electricity is forecast to rise 60 per cent by 2030. Almost three quarters of this increased demand is expected to be met by natural gas⁴. The demand for natural gas is increasing globally because it is a relatively clean source of energy compared to more carbon-intensive fuels such as coal or oil.

With some offshore gas fields reaching the end of their production life, development of the State’s onshore shale and tight gas resources will help to meet this growing demand.

Development of the shale and tight gas industry in Western Australia will bring significant economic benefits to the State including increased employment, regional growth and royalties.

What is the current situation in WA?

Western Australia currently produces oil and gas which flows freely when tapped by a well.

The first production of oil occurred in the 1960s when oil was produced from beneath Barrow Island. Since then, more than 100 oil and gas fields have been developed in Western Australia. The majority of these fields are located offshore in the North West Shelf.

Although there continues to be small scale onshore production of traditional oil and gas, the State’s onshore shale and tight gas resources are yet to be commercially developed.

Recent advances in drilling techniques and hydraulic fracturing have made the production of these resources more economically viable.

Estimates suggest WA’s onshore shale and tight gas resources are significant and potentially twice that of its known offshore gas resources.

Since 2005, 15 exploration wells have been drilled to search for shale and tight gas resources in Western Australia.

Seven of these involved hydraulic fracturing to test the capacity of the reservoir to generate commercial gas flows and were approved by DMP, in consultation with the Environmental Protection Authority (EPA), with strict regulatory requirements to ensure they did not have any significant adverse impacts on the environment.

The EPA, in its Bulletin No. 15 (September 2011), stated it will determine whether to assess hydraulic fracturing related projects referred to it on a case-by-case basis, as it does for other petroleum and mining proposals.

The United States

The shale gas boom is largely credited with reducing US carbon emissions to a 20-year low due to coal-fired electricity being increasingly replaced with cheaper, cleaner natural gas burning power stations.

The increase in natural gas production has also resulted in a decline in gas prices which has revived the country’s manufacturing industry and significantly reduced the need to import gas and oil from other countries.

The EPA formed the view that because recent proposals were small scale ‘proof of concept’ proposals, they were not likely to have a significant impact on the environment. Further, the EPA considered any potential impacts could be managed through the implementation of Environmental Management Plans that would be regulated by DMP.

In 2012, a State Agreement was established with Buru Energy Limited and Mitsubishi Corporation in an effort to facilitate the supply of gas into the Western Australian domestic market.

If exploration in Western Australia proves successful, significant commercial production is anticipated to be five to 10 years away.

³Energy 2031, Strategic Energy Initiative Directions Paper, March 2011

⁴Australian Energy Projections to 2034-35 Strategic Bureau of Resources and Energy Economics - Dec 2011

What might a shale and tight gas project look like?

Footprint

The size of the gas field being targeted and the number of wells and infrastructure required to extract and pipe the gas determines the surface footprint of an activity.

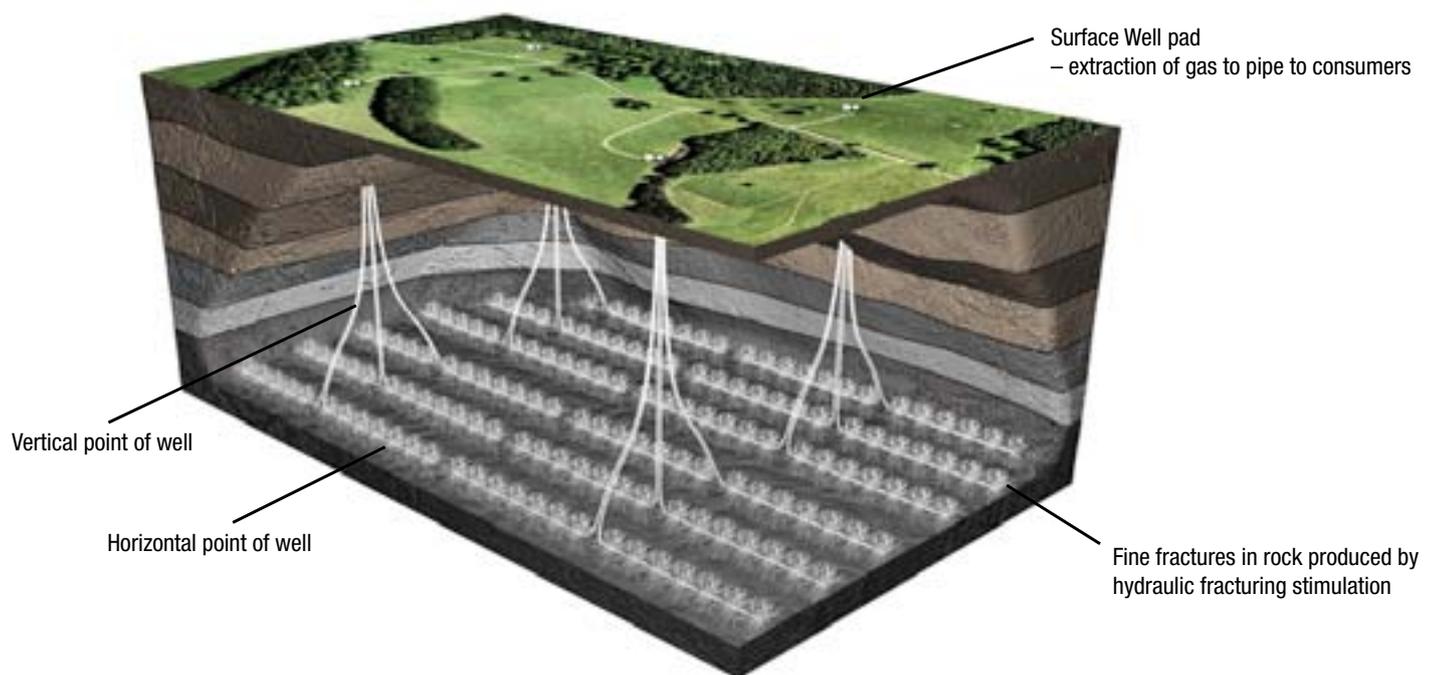
As an example⁵, the average amount of land required to be cleared for a shale gas well site (or pad) is approximately 1.5–2 hectares.

Advances in horizontal drilling techniques now enable multiple wells to be drilled from one well pad. This significantly limits the footprint of surface activity, including the number of access roads.

Based on current geological and scientific information, it is estimated an established gas field could contain one well pad per 225 hectares.

The figure below is an indicative representation of how multiple horizontal wells from a single pad are able to access gas in shale and tight rock formations.

The hydraulic fracturing process generally takes between one to 10 days. Once the hydraulic fracturing process is complete, the majority of the equipment is removed from the site. Generally, all that remains visible at the surface is a series of sealed valves approximately two metres high, and connecting pipelines that run beside access tracks if they are not buried.



(Diagram not to scale)

Source: Styles, Keele University, UK

⁵Engineering Energy: Unconventional Gas Production – A study of shale gas in Australia, ACOLA May 2013

Land access

As for other industries, secure access to land is critical for the development of the oil and gas sector.

Access to land by licensed industry operators is important to ensure these State-owned resources can be developed to benefit the wider community. DMP is confident the shale and tight gas industry can co-exist with other industries and that environmental, heritage and cultural values of land are adequately protected.

Petroleum operators proposing to conduct exploration or production activities on private land must negotiate a land access agreement with the land owner before approval is granted by DMP for any activity to take place. Agreements can sometimes include compensation.

If the private land owner and petroleum operator cannot reach an agreement, either party may apply to the Magistrates Court to determine a fair compensation arrangement.

Once a shale and tight gas activity is complete, petroleum operators are required to decommission the wells and rehabilitate the surrounding environment.

Petroleum and peak agricultural bodies in WA are developing standards to ensure the land access negotiation process is fair and equitable.

The photograph below is an example of a typical shale gas well pad during exploration.



Source: Gibb Maitland-1 Well, Southern Canning Project. By permission New Standard Onshore - Grant Taylor Photography

How is shale and tight gas extracted?

Shale and tight gas is generally extracted from the ground by horizontal drilling of a well and hydraulic fracturing of the gas-bearing rock at depths of more than two kilometres.

Horizontal wells

Experience overseas has demonstrated horizontal wells drilled through the gas-bearing rock formation provide the most cost effective way to extract the gas. Wells typically need to be drilled vertically for more than two kilometres and then diverted horizontally along the gas-bearing rock formation to reach the gas.

Wells are designed and constructed to ensure the gas is safely contained inside the well to enable extraction to the surface without leakage. The integrity of the well is achieved by cementing several layers of protective steel casing between the well bore and the rock face through which the bore hole passes (see water protection, page 8).

Hydraulic fracture stimulation (hydraulic fracturing)

Hydraulic fracturing is an extraction process which stimulates the release and flow of oil and gas.

It has been a commercial process in the oil and gas industry since 1947. Approximately 2.5 million hydraulic fracture stimulations have been completed world wide. In Western Australia, more than 780 wells have been hydraulically fractured since 1958. Most of these were in traditional oil and gas wells on Barrow Island in the 1960s.

Historically, hydraulic fracturing involved pumping a small amount of fluid under low pressure into a targeted rock formation to open up small gaps in the rock to increase the flow of oil and gas.

However, recent developments in hydraulic fracturing technology mean higher pressures can now be used to create small fractures to release gas from shale and tight rocks which previously did not produce gas.

These fractures allow trapped gas within the rock to flow into the well through the fracture network. Typically, a fracture is three to six millimetres wide and can extend out horizontally for up to 400 metres and vertically for 100 metres.

The pumping of the fluid down a well is controlled and monitored, generally occurring at around 690 bar (10,000psi), or 300 times the pressure of a car tyre.

There are normally three stages of well development – exploration, evaluation and production. Hydraulic fracturing may be required at each stage.

During the exploration stage, potential resources are identified using a wide range of geological techniques including seismic surveys. Vertical exploration wells are then generally drilled to test the target rock formation for petroleum products. Hydraulic fracturing of an exploration well may occur during this stage to determine if further evaluation is warranted.

In the evaluation stage, multiple vertical and/or horizontal wells are drilled and undergo hydraulic fracturing to determine the physical extent of reserves and likely production rate of a newly discovered gas field. If the evaluation is successful, pipeline access and processing options are then investigated prior to commercial production.

During the production stage, horizontal wells are developed by hydraulic fracturing to optimise production, while further evaluation wells are being drilled and tested.

Fluids used in hydraulic fracturing typically contain 90 per cent water, 9.5 per cent sand (or an equivalent material) and 0.5 per cent chemicals.

Water is used to fracture the rock and transport the sand and chemicals through the well, and transfer the pressure to create a fracture network.

Sand is generally used to hold the fractures open to increase the flow of natural gas into the well.

Chemicals are used to improve the transportation of the sand, reduce friction, prevent the growth of bacteria, reduce chemical precipitation and prevent corrosion over time.

Water use

The volume of water needed to conduct hydraulic fracturing in a well varies from project to project. It depends on the size and length of the well, and the type of rocks being fractured.

The table below shows the estimated water usage for a typical well during the exploration, evaluation and production stages of a shale or tight gas field.

| Phase | Water required per well | Equivalent to |
|-------------|-------------------------|--|
| Exploration | 7 million litres | 3 Olympic size swimming pools of water |
| Evaluation | 7 – 17 million litres | 3 – 7 Olympic size swimming pools of water |
| Production | 21 million litres | 9 Olympic size swimming pools of water |

By way of comparison, the average water allocation to irrigate a 10 hectare vegetable crop in WA for one year is shown below.

| Activity | Water required | Equivalent to |
|-------------------------|--------------------|---|
| Irrigate vegetable crop | 150 million litres | 64 Olympic size swimming pools of water |

Water used in hydraulic fracturing is often drawn from underground sources and can be fresh, brackish or saline. Hydraulic fracturing fluid can also be retreated and reused. All proposals involving hydraulic fracture are required to include details of how the hydraulic fracturing fluid will be treated, reused (where applicable) and disposed. Proponents are encouraged to reuse this fluid wherever possible.

The Department of Water regulates the taking of water, the construction of water bores and water allocations to manage water resources at a sustainable level to protect existing users and the environment.

Any proposed petroleum activity likely to have a significant impact on water resources and the environment is referred to the Environmental Protection Authority for an independent assessment.

Water protection

Protection of the State's water resources is of the highest priority.

Water resources are protected under Western Australian legislation to ensure they are sustainable and that groundwater and surface water is not adversely affected by any proposed activity.

Shale and tight gas operators are also required by DMP to meet international standards for well construction so activity does not contaminate any water resources.

These standards address the type and quality of equipment used as well as testing and monitoring to ensure compliance. The wells must have several layers of cement and steel casing where they pass through underground water resources.

Before any activity can take place, wells must also be tested to pressures above those required for hydraulic fracturing to ensure there are no leaks.

A recent Australian study⁶ found there have been no cases internationally where hydraulic fracturing associated with the extraction of shale and tight gas has inadvertently intersected a water source to cause contamination.

Petroleum operators in WA are required to continuously monitor hydraulic fracturing activities to check the small fractures and hydraulic fluids are contained in the rock area targeted deep underground. This ensures gas, as well as the recovery of hydraulic fracturing fluid, does not contaminate overlying water resources.

Petroleum operators must also monitor and report on emissions and discharges from its activities and report these results to DMP to protect the State's water resources.

⁶Engineering Energy: Unconventional Gas Production – A study of shale gas in Australia, ACOLA May 2013

Chemicals

In Western Australia, legislation requires that all chemicals used down a well are approved, based on an assessment of their toxicity, by DMP and this information is made public. These are the strongest chemical disclosure requirements of any Australian jurisdiction.

Chemicals used in the make-up of the hydraulic fracturing fluid depend on the properties of the rock being targeted.

The majority of these chemicals can be found in everyday items such as household cleaning products, food additives, cosmetics and swimming pools. The use of any chemical always involves a degree of risk – but that risk can be minimised through regulation and proper management.

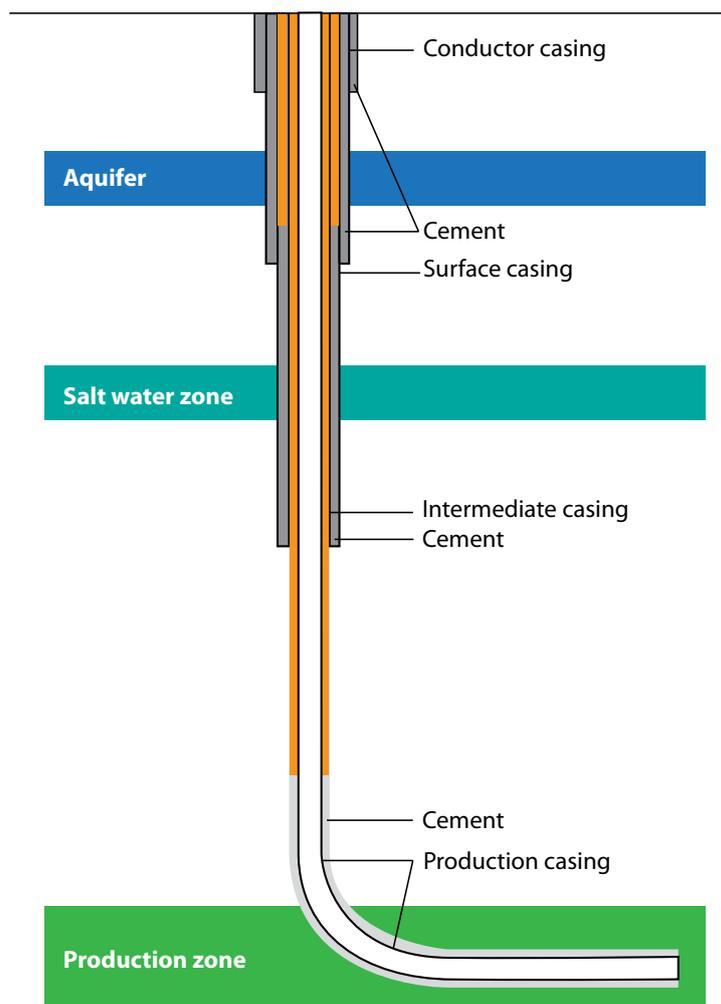
The safe use, transport, storage and disposal of chemicals are strictly regulated across government to ensure public health, water resources and the environment are protected.

The diagram below shows an example of a petroleum well designed for hydraulic fracturing and shale and tight gas extraction.

How is the oil and gas industry regulated – now and into the future?

As the lead agency for the oil and gas sector DMP, and its predecessors, has been regulating the oil and gas industry for more than 50 years. This includes the expansion that has occurred offshore in the last 10 years.

Legislation, regulations and guidelines have been continually updated to reflect technological changes, as well as Western Australia’s changing community values and expectations. These values today include protection of public health and the environment, a cleaner energy mix, and a fair and equitable approach to land use.



Legislation

The key agencies, the roles and the legislation used to regulate the onshore oil and gas industry are shown in the table below.

| | Agency | Role | Legislation |
|-------|--------------------------------------|---|--|
| STATE | Department of Aboriginal Affairs | Assessment of Aboriginal heritage | <i>Aboriginal Heritage Act 1972</i> |
| | Department of Agriculture and Food | Assessment of environmental biosecurity issues such as pests, weeds and diseases | <i>Biosecurity and Agriculture Management Act 2007</i> |
| | Department of Environment Regulation | Assessment of emissions and discharges; issuing of works approvals and licences; management of contaminated sites | <i>Environmental Protection Act 1986</i> <i>Contaminated Sites Act 2003</i> |
| | Department of Health | Assessment of water quality in water supplies to safeguard human health | <i>Health Act 1911</i> |
| | Department of Mines and Petroleum | Assessment of environment plans; works program; well management plan; safety management system; safety case; native vegetation clearing permit applications | <i>Dangerous Goods Safety Act 2004</i> <i>Petroleum and Geothermal Energy Resources Act 1967</i> <i>Petroleum Pipelines Act 1969</i> <i>Petroleum (Submerged Lands) Act 1982</i> <i>Delegated authority under the Environmental Protection Act 1986 for native vegetation clearing</i> |
| | Department of Parks and Wildlife | Management of conservation reserve system; conserving threatened species and ecological communities | <i>Conservation and Land Management Act 1984</i> <i>Wildlife Conservation Act 1950</i> |
| | Department of Water | Assessment of proposed water wells and taking of water licence applications. Management of safeguarding public drinking water sources | <i>Rights in Water and Irrigation Act 1914</i> <i>Metropolitan Water Supply, Sewerage and Drainage Act 1909</i> <i>Country Areas Water Supply Act 1947</i> <i>Water Agencies (Powers) Act 1984</i> |
| | Environmental Protection Authority | Environmental impact assessment for proposals likely to have significant environmental impacts | <i>Environmental Protection Act 1986</i> |
| CWLTH | Radiological Council | Assessment of naturally occurring radioactive material licence applications for storage and transport | <i>Radiation Safety Act 1975</i> |
| | Department of Environment | Environmental impact assessment for proposals likely to have an impact on matters of national environmental significance | <i>Environment Protection and Biodiversity Conservation Act 1999</i> |
| | Clean Energy Regulator | Reporting of greenhouse gas emissions | <i>National Greenhouse and Energy Reporting Act 2007</i> |
| | National Native Title Tribunal | Assessment of Native Title claimant applications and Indigenous land use agreements. | <i>Native Title Act 1993</i> |

The approvals processes under the adjacent legislation require petroleum operators to identify and manage health, safety and environmental impacts associated with the proposed activity by increasingly adopting a risk-based approach.

Any proposals which could potentially have a significant impact on the environment must be referred to the Environmental Protection Authority for independent assessment.

Continuous reform ensures Western Australia has strong legislation, particularly in relation to transparency of information and enforcement. In addition, DMP has released for public comment revised regulations for well design and operation requirements. These changes follow new petroleum environment regulations which came into effect in 2012, specifically addressing issues around shale and tight gas activities.

The Department of Water is also reviewing its water legislation to ensure the quantity and quality of Western Australia’s water resources are managed sustainably.

Framework

Experience from within WA and other jurisdictions highlights the importance of a transparent regulatory system to provide the community with confidence the shale and tight gas industry is being developed responsibly.

The State’s long term regulatory approach is underpinned by the following key principles:

- effective, transparent and risk-based regulation;
- whole-of-government coordinated regulation;
- engagement with stakeholders, particularly local communities; and
- ensuring national initiatives support the Western Australian Government approach.

These principles form the basis of Western Australia’s regulatory framework for shale and tight gas, which is currently being documented. This framework document will provide a detailed explanation of how the industry is regulated to protect community and environmental values.

Importantly, the framework document will outline key actions and outcomes for government, industry and the community, and be used to inform policy, and the continuous process of regulatory and operational reforms. Administrative agreements provide a consistent and coordinated whole-of-government regulatory approach.

To facilitate this process, an inter-agency working group for shale and tight gas was established in 2011. The group is chaired by DMP, and includes the Departments of Agriculture and Food, Environment Regulation, Water, Health, Parks and Wildlife, State Development, and the Office of the Environmental Protection Authority.

A key aspect of this group’s work is to ensure the community’s expectations regarding health and environmental issues are addressed.

In addition, an Inter-Agency Science Working Group has been established to identify geological and environmental science needs to stimulate research and build on current understanding of the potential impacts of the shale and tight gas industry in Western Australia.

An important part of developing the framework is addressing the concerns of a wide range of stakeholders including industry, land holders, and environmental and regional community groups. It is anticipated the framework document will be finalised by mid-2014.

Through a process of continuous stakeholder engagement, State Government agencies will regularly review and reform the regulatory framework to reflect changing scientific, environmental and community needs.

When is the shale and tight gas industry likely to become commercial?

Western Australia has the potential to be a major producer of shale and tight gas in the future, but the timing for development on a significant commercial scale is difficult to estimate.

It will depend on the following factors:

- *Energy demand and commodity prices:* evolving international and national energy markets will determine future demands for natural gas which, in turn, will affect the level of investment the State’s shale and tight gas industry attracts.
- *The availability of equipment, services and skilled labour to mobilise the industry:* currently, WA has three drill rigs and no hydraulic fracture units available to conduct activities required for production. Equipment would need to be mobilised from the east coast, or overseas locations.
- *Development of supporting infrastructure:* the remote location of Western Australia’s shale and tight gas resources, particularly in the Canning basin, means there is a need for additional facilities such as pipelines, roads and general services to be approved and established before production can take place.

What does this mean for our community?

Any major development near a populated area brings changes to a community. These changes can include increases in population and the associated demand on local services (e.g. education, housing and health services), as well as new employment and business opportunities. Adverse impacts on lifestyle and amenity will receive careful consideration through the engagement of the community.

The development of a shale and tight gas industry will require the use of local facilities, labour and services in regional areas. The level of impact will be determined by the scale of a project.

WA is well positioned to learn from other jurisdictions to ensure community opportunities and impacts are managed appropriately, so that industry is developed in a safe, sustainable and environmentally responsible manner.

DMP is committed to ensuring air and water quality is not adversely impacted by shale and tight gas activities. This is achieved through the State’s existing regulatory approvals processes, ongoing monitoring requirements for operators and, where necessary, independent assessment of proposals by the Environmental Protection Authority.

How is the community involved?

A commitment to engage with affected communities early and often has been made by DMP. The department also expects industry to establish productive relationships with those communities it intends to operate in.

Since 2011, DMP has met with a range of stakeholders across Western Australia. A strong focus of the department's community engagement efforts has been in the Midwest and Kimberley regions, where some shale and tight gas exploration activities are already occurring. Many people are seeking more knowledge about this emerging industry to better understand the implication and benefits.

Draft environmental regulations (Petroleum and Geothermal Energy Resources (Environment) Regulations 2012) were released for public comment in 2012. The results of this consultation directly influenced DMP's decision to enforce public disclosure of chemicals and additives introduced to a well and the publication of Environment Plan summaries on DMP's website.

In addition, draft petroleum resource management regulations, particularly around well integrity and baseline water monitoring, have been released by the department for public comment.

This ongoing consultation with a wide range of stakeholders including industry, land holders and environmental and regional community groups is shaping the regulatory framework for this emerging industry.

A consolidated regulatory framework document is expected to be released by mid-2014.

Where can I find more information?

Information about shale and tight gas is available on DMP's website at: www.dmp.wa.gov.au/shaleandtightgas

Subscribe to DMP's natural gas from shale and tight rocks RSS feed (on the DMP website) to receive the latest news and updates, including the release of documents for public comment.

You can also contact DMP on (08) 9222 3333 or email shaleandtightgas@dmp.wa.gov.au.



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